

Appendix E

Model RD, RD Oversight, RA, and RA Oversight SOWs

MODEL STATEMENT OF WORK FOR REMEDIAL DESIGN

____ SITE, _____ COUNTY, _____ STATE

ATTACHMENTS

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Points for the Work Assignment Manager or Remedial Project Manager (WAM/RPM) to consider in preparing the Statement of Work (SOW) for Remedial Design (RD):

The purpose of this SOW is twofold:

1. **To tell the contractor what you want done.** Be as specific as possible in describing what you want the contractor to do. The contractor will write a work plan and budget describing how and at what cost the requirements will be met and ultimately will be responsible for performing those requirements. Whenever there is an absolute requirement (e.g., prepare the Quality Assurance Project Plan (QAPP) in accordance with QAMS-005/80 (December 29, 1980)), state it. Add the attachments to the SOW: (1) Summary of Major Submittals for the Remedial Design at ____ (Site), (2) Work Breakdown Structure, and (3) Transmittal of Documents for Acceptance by EPA.

2. **To give the contractor a work breakdown structure for recording costs.** In this manner, work plan costs and final costs of different remedial design projects can be compared and analyzed.

Use of a Work Breakdown Structure (WBS)

1. A WBS has been developed for this model work assignment for EPA to track the initial and final costs of each element used for preparing future cost estimates and to share this data with other Federal agencies. The WBS is, essentially, the outline for this work assignment and is included as Attachment 2 to the SOW.

2. If an element is not to be used, do not change the numbering system; instead, insert "not used" or "N/A" after the element number after deleting the text for that element.

3. For the items used for a given project, additional descriptions (e.g., type of samples and estimated number) should be added in order for the contractor and WAM/RPM to develop estimated costs on a common basis

3.0 Introduction

.0.1 Site Description

Provide a brief site description and site history.

.0.2 Purpose

The purpose of this Statement of Work (SOW) is to set forth the requirements for the Remedial Design (RD) of the selected remedy as defined in the Record of Decision (ROD) issued on

_____ (date). The RD is generally defined as those activities to be undertaken by the contractor to develop the final plans and specifications, general provisions, and special requirements necessary to translate the ROD into the remedy to be constructed under the remedial action (RA) phase. The RA is generally defined as the implementation phase of site remediation or construction of the remedy, including necessary operation and maintenance, performance monitoring, and special requirements. The RA is based on the RD to achieve the remediation goals specified in the ROD. This SOW is designed to provide the framework for conducting the RD activities at _____ (site). The goal is to complete and deliver the final plans and specifications within _____ months after approval of the work plan. The estimated completion date for this work assignment is _____.

.0.3 General Requirements

- .0.3.1 The contractor shall conduct the RD in accordance with this SOW and consistent with the ROD issued on _____ (date), the *Remedial Design/Remedial Action (RD/RA) Handbook* (U.S. EPA Office of Solid Waste and Emergency Response (OSWER), 9355.0-04B, EPA 540/R-95/059, June 1995), and all other guidance used by EPA in conducting an RD. The primary contact for this work assignment is _____, Tel. _____; the secondary contact is _____; Tel. _____.
- .0.3.2 A summary of the major deliverables and a suggested schedule for submittals are attached (Attachment 1). The contractor shall submit the major deliverables using the form Transmittal of Documents for Acceptance by EPA, Attachment _____.

The attachments to this model SOW may be copied and completed for a given RD. Attachment 4 is a form for use by the contractor in the transmittal of documents to EPA and should be an attachment to the completed SOW. Attachment 5 is a transmittal register log for use by the WAM/RPM in tracking documents submitted by the contractor.

- .0.3.3 Specifically, the RD involves the design of _____.
- .0.3.4 The contractor shall furnish all necessary and appropriate personnel, materials, and services needed for, or incidental to, performing and completing the RD.
- .0.3.5 A list of primary guidance and reference material is attached (Attachment 3). In all cases, the contractor shall use the most recently issued guidance.
- .0.3.6 The estimated cost of the RA, as outlined in the ROD, is \$ _____.
- .0.3.7 The contractor shall communicate at least weekly with the Work Assignment Manager or Remedial Project Manager (WAM/RPM), either in face-to-face meetings or through conference calls.
- .0.3.8 The contractor shall notify the WAM/RPM when 75 percent of the approved work assignment budget has been expended and when 95 percent has been expended.
- .0.3.9 The contractor shall document all decisions that are made in meetings and conversations with EPA. The contractor shall forward this documentation to the WAM/RPM within two working days of the meeting or conversation.

It is the WAM's responsibility to document fully all decisions made. The contractor's documentation is used for confirmation only.

- .0.3.10 EPA will provide oversight of contractor activities throughout the RD. EPA review and approval of deliverables is a tool to assist this process and to satisfy, in part, EPA's responsibility to provide effective protection of public health, welfare, and the environment. EPA will review deliverables to assess the likelihood that the RD will achieve its remediation goals and that its performance and operations requirements have been correctly identified. Acceptance of plans and specifications by EPA does not relieve the contractor of responsibility for the adequacy of the design.
- .0.4 Record-Keeping Requirements

The contractor shall maintain all technical and financial records for the RD in accordance with the contract. At the completion of the RD, the contractor shall submit _____ copies of the official record of the RD in _____ (format) to the WAM/RPM.

1. Technical and financial records must support decisions made during the RD as well as cost recovery.
2. Check with the Regional Records Manager and with Regional Counsel regarding the distribution, number of copies, and preferred format (i.e., hard copy, microform, CD-ROM) for the official records of the RD.

.0.5 Equipment Transfer

At the completion of the RD work assignment, the contractor shall transfer to the EPA Equipment Coordinator all equipment purchased with contract funds in accordance with the contract.

.0.6 Project Closeout

At the completion of the RD work assignment, the contractor shall perform all necessary project closeout activities as specified in the contract. These activities may include closing out any subcontracts, indexing and consolidating project records and files as required in Paragraph 0.4 above, and providing a technical and financial closeout report to EPA. Final costs shall be reported to EPA (on disk) broken down into the cost for each element of the Work Breakdown Structure (WBS) (Attachment 2) for this work assignment.

3.1 Project Planning and Support

The purpose of this task is to determine how the site-specific remediation goals, as specified in the ROD, will be met. The following activities shall be performed as part of the project planning task:

.1.1 Project Planning

- .1.1.1 Attend Scoping Meeting.** Before or concurrent with developing the Work Plan, the contractor shall attend a scoping meeting to be held at the EPA Regional Office.

Location of meetings and RPM expectations for the number of contractor personnel to attend should be specified for cost estimation purposes.

- .1.1.2 Conduct Site Visit.** The contractor shall conduct a site visit with the EPA WAM/RPM during the project planning phase to assist in developing a conceptual understanding of the RD requirements for the site. Information gathered during the visit shall be used to better scope the project and to help determine the extent of additional data necessary to implement the RD. A Health and Safety Plan (HASP) is required for the site visit. The contractor shall prepare a report that documents all EPA, contractor, and site personnel present at the visit; all decisions made during the visit; any action items assigned, including person responsible and due date; any unusual occurrences during the visit; and any portions of the site that were not accessible to the contractor and the effect of this on the RD. This report shall be submitted to the EPA WAM/RPM within 10 calendar days of the site visit.
- .1.1.3 Evaluate Existing Information.** The contractor shall obtain, copy (if necessary), and evaluate existing data and documents, including the Remedial Investigation/Feasibility Study (RI/FS), the ROD, and other data and documents as directed by EPA. This information shall be used to determine if any additional data are needed for RD implementation. The documents available for review are listed in Attachment _____.

The WAM/RPM will create an attachment to this SOW. Additional documents to list in the attachment could include the summary of the "Information Collection" effort (see Chapter 3 of the Guidance for Scoping the Remedial Design), Focused Feasibility Studies (FFSs), State documentation, hydrogeological information, and RPM file data. However, to control expenses, limit review to pertinent documents specific to the site.

- .1.1.4 Develop Work Plan. The contractor shall present the general approach that will be used for the RD at a Work Plan scoping meeting with the WAM/RPM. This meeting will be held at the Region _____ office.

If the RD will be complex, consider modifying subtask 3.1.1.4(1) to include a scoping meeting. A scoping meeting held before the contractor finalizes the technical approach ensures that the government and the contractor agree on the approach to be taken and that the work plan reflects the agreed-upon approach. The contractor may not have to rewrite the work plan if this is done.

- (1) Develop Draft Work Plan. The contractor shall prepare and submit a draft RD Work Plan within 30 calendar days after Work Assignment (WA) initiation. The contractor submits the original to the Contracting Officer (CO), one copy to the Project Officer (PO), and one copy to the WAM/RPM. The Work Plan shall include a comprehensive description of the additional data collection and evaluation of activities to be performed, if any, and the plans and specifications to be prepared. A comprehensive design management schedule for completion of each major activity and submittal shall also be included. The Work Plan shall be developed in conjunction with the Sampling and Analysis Plan (SAP) and HASP, although each plan shall be delivered under separate cover within 30 days after WA initiation.

1. The submittal requirements in this SOW must be in accordance with the submittal requirements for the contract.
2. An independent government cost estimate (IGCE) for the RD must be prepared before the work assignment (WA) is issued to the contractor.
3. Verify the work plan submittal timeframe with the PO.
4. Additional copies of the work plan can be submitted to the WAM/RPM, if specified, for distribution to other technical staff.

- (a) Develop Narrative. Specifically, the Work Plan shall present the following:
- A statement of the problem(s) and potential problem(s) posed by the site and how the objectives of the RD will address the problem(s).
 - A background summary setting forth: (1) a brief description of the site including the geographic location and a description of the physiographic, hydrologic, geologic, demographic, ecological, cultural, and natural resource features of the site; (2) a brief synopsis of the history of the site including a summary of past disposal practices and a description of previous responses that have been conducted by local, State, Federal, or private parties at the site; (3) a summary of the existing data including physical and chemical characteristics of the contaminants identified and their distribution among the environmental media at the site.
 - The contractor's technical and management approach to each task to be performed, including a detailed description of each task; the assumptions used;

the identification of any technical uncertainties (with a proposal for the resolution of those uncertainties); the information needed for each task; any information to be produced during and at the conclusion of each task; and a description of the work products that will be submitted to EPA. The contractor shall identify any subcontractors it plans to use to accomplish all or part of a task's objectives. Tasks and subtasks shall be presented in the same WBS format as provided in this work assignment.

- A schedule for specific dates for the start and completion of each required activity and submission of each deliverable required by this SOW. (See Attachment 1 for format.) This schedule shall also include information about timing, initiation, and completion of all critical path milestones for each activity and deliverable and the expected review time for EPA.

For schedule development, the WAM/RPM should indicate to the contractor whether design activity will continue concurrent with EPA design review or whether work will stop until the contractor receives design review comments. In deciding which to prescribe, weigh the trade off between the cost of possible rework versus a shortened schedule.

- (b) Develop Cost Estimate. The contractor's estimated cost to complete the work assignment shall be broken down into the Level of Effort (by P-level) and cost for each element of the Work Breakdown Structure (Attachment 2) and submitted to EPA on disk.
- (c) Internal QA and Submission of Draft Work Plan.
- (2) Prepare Final Work Plan
 - (a) Attend Negotiation Meeting. The contractor shall attend a Work Plan negotiation meeting at the Region _____ office.
 - (b) Modify Draft Work Plan and Cost Estimate. If the contractor finds that the remedial action being designed differs significantly from the ROD or that an ARAR cannot be met, the contractor shall describe the issue and recommend technical solutions in a memo to the WAM/RPM. The contractor shall make revisions to the Work Plan as a result of EPA's comments and/or negotiation agreements. The final work plan shall be submitted within 15 days after receipt of EPA comments.
 - (c) Internal QA and Submission of Final Work Plan.

.1.2 Preparation of Site-Specific Plans

- .1.2.1 Develop Site Management Plan. After EPA approval of the RD Work Plan, the contractor shall prepare a Site Management Plan (SMP) that provides EPA with a written understanding of how access, security, contingency procedures, management responsibilities, and waste disposal are to be handled.
 - (1) Develop Pollution Control and Mitigation Plan
 - (2) Develop Transportation and Disposal Plan (Waste Management Plan)
- .1.2.2 Develop Health and Safety Plan. Prepare a site-specific HASP that specifies employee training, protective equipment, medical surveillance requirements, standard operating procedures, and a contingency plan in accordance with [40 CFR 300.150 of the NCP and] 29 CFR 1910.120 1(1) and (1)(2). Whenever possible, refer to the HASP developed for the RI/FS when preparing the HASP for the RD. A task-specific HASP must also be prepared to address health and safety requirements for site visits.
- .1.2.3 Develop Sampling and Analysis Plan (Chemical Data Acquisition Plan)
 - (1) Quality Assurance Project Plan. The contractor shall prepare a Quality Assurance Project Plan (QAPP) in accordance with EPA QA/R-5 (latest draft or revision). The QAPP shall describe the project objectives and organization, functional activities, and quality assurance/quality control (QA/QC) protocols that shall be used to achieve the desired Data Quality Objectives (DQOs). The DQOs shall, at a minimum, reflect use of analytical methods for identifying contamination and addressing contamination

consistent with the levels for remedial action objectives identified in the National Contingency Plan. The QAPP developed for the RI/FS should be referenced or adapted whenever possible when preparing the QAPP for the RD.

- (2) Field Sampling Plan. Prepare a Field Sampling Plan (FSP) that defines the sampling and data collection methods that shall be used for the project. The FSP shall include sampling objectives; sample locations and frequency; sampling equipment and procedures; sample handling and analysis; and a breakdown of samples to be analyzed through the Contract Laboratory Program (CLP) and through other sources, as well as the justification for those decisions. The FSP shall consider the use of all existing data and shall justify the need for additional data whenever existing data will meet the same objective. The FSP shall be written so that a field sampling team unfamiliar with the site would be able to gather the samples and field information required. The FSP developed for the RI/FS must be referenced or adapted whenever possible when the FSP is prepared for the RD; the contractor shall document any required changes to the FSP in a memorandum to the WAM/RPM.

1. Depending on the complexity of the sampling effort needed to support the RD, the FSP and QAPP can be combined into a single Sampling and Analysis Plan (SAP).
2. Minimize the duplication of data collection by requiring the contractor to use existing data whenever practicable. Contractors tend to "mistrust" data collected by others regardless of the quality. Limiting data collection can shorten the design period.
3. Reduce time and costs by using an on-site laboratory to analyze routine samples rather than going through the CLP.
4. Identify whether audits will be performed and specify contractor response items.

(3) Data Management Plan

(4) Develop Other Plan(s)

.1.3 Project Management

- .1.3.1 Prepare Periodic Status Reports. The contractor shall prepare Monthly Progress Reports.
 - (1) Document Cost and Performance Status. The contractor shall document the status of each task and report costs and level of effort (by P-level) expended to date.
 - (2) Prepare and Submit Invoices
- .1.3.2 Meeting Participation and Routine Communications. The contractor shall attend project meetings, provide documentation of meeting results, and shall contact the WAM by telephone on a weekly basis to report project status.
- .1.3.3 Perform Engineering Network Analysis
- .1.3.4 Manage, Track, and Report Equipment Status. The contractor shall manage, track, and report the status of all site-specific equipment.
- .1.3.5 Work Assignment Closeout

The RPM/WAM should specify the format for submissions (e.g., Monthly Progress Reports) if there are Region-specific requirements or other specific requirements.

.1.4 Subcontract Procurement and Support Activities

- .1.4.1 Identification and Procurement of Subcontractors. Procure and administer the necessary subcontracts, including, but not limited to the following:
 - (1) Drilling Subcontractor
 - (2) Surveying Subcontractor
 - (3) Geophysical Subcontractor

- (4) Site Preparation Subcontractor
- (5) Analytical Services Subcontractor(s)
- (6) Waste Disposal Subcontractor
- (7) Treatability Subcontractor(s)
- (8) Other(s)
- .1.4.2 Establish and Carry Out a QA Program for Subcontracts
- .1.4.3 Perform Subcontract Management

3.2 Community Relations

The contractor shall provide community relations support to EPA throughout the RD. The contractor shall provide community relations support in accordance with *Community Relations in Superfund: A Handbook*, June 1988. Community relations shall include the following subtasks:

Listed below are a number of possible community relations activities the RPM/WAM may require

- .2.1 Develop Community Relations Plan (CRP)

The contractor shall develop an RI/FS CRP to address community relations requirements during the RD. This CRP may be modified from an existing CRP to meet site-specific requirements.

 - .2.1.1 Conduct Community Interviews
 - .2.1.2 Prepare the CRP
 - (1) Draft CRP
 - (2) Final CRP
- .2.2 Prepare Fact Sheets

The contractor shall prepare a fact sheet that informs the public about activities related to the final design, a schedule for the RA, activities to be expected during construction, provisions for responding to emergency releases and spills, and any potential inconveniences such as excess traffic and noise that may affect the community during the RA.
- .2.3 Public Hearing, Meetings, and Availability Support

The contractor shall support and assist in public hearings, meetings, and open houses. The contractor shall prepare presentation materials and provide support as needed for public meetings.

- 1. The number and location of anticipated public meetings should be identified in the SOW.
- 2. The RPM should specify the number of contractor personnel expected to attend the public meetings

- .2.3.1 Technical Support. The contractor shall provide technical support for community relations. This support may include preparing technical input to news releases, briefing materials, and other community relations vehicles, and helping the WAM/RPM to coordinate with local agencies.
- .2.3.2 Logistical and Presentation Support
- .2.3.3 Public Notice Support
- .2.4 Maintain Information Repository and Mailing Lists

The contractor shall develop or revise site mailing lists and maintain a repository of information on activities related to the site-specific remedial design as described in Appendix A.8, page A-19, of *Community Relations in Superfund: A Handbook*, June 1988.

The RPM/WAM should specify the format for Community Relations submissions (e.g., fact sheets, news releases) if there are Region-specific requirements or other specific requirements.

3.3 Data Acquisition

Data acquisition entails collecting environmental samples and information required to support the RD. The planning for this task is accomplished in Task 3.1, Project Planning and Support, which results in the plans required to collect the field data. Data acquisition starts with EPA's approval of the FSP and ends with the demobilization of field personnel and equipment from the site.

The contractor shall perform the following field activities or combination of activities for data acquisition in accordance with the EPA-approved FSP and QAPP developed in Task 3.1.

Before beginning field activities, consider specifying a kickoff meeting with all principal personnel to clarify objectives, communication channels, etc., to ensure the efficient use of available funds.

3.1 Mobilization and Demobilization

Provide the necessary personnel, equipment, and materials for mobilization and demobilization to and from the site for the purpose of conducting the sampling program under subtask 3.3.2, Field Investigation.

3.1.1 Identify Field Support Equipment, Supplies, and Facilities

3.1.2 Mobilization. Mobilize and set up a field laboratory to facilitate rapid turnaround times for analytical results and identification of sample locations for subsequent sampling rounds.

(1) Site Preparation

- (a) Perform Demolition
- (b) Clearing and Grubbing
- (c) Perform Earthwork
 - Provide Borrow Pit
 - Construct Haul Roads
 - Construct Roads, Parking, Curbs, and Walks
 - Install Storm Drainage and Subdrainage
 - Install Fencing and Site Security

(2) Installation of Utilities

- (a) Install Electrical Distribution
- (b) Install Telephone and Communication System(s)
- (c) Install Water, Sewage, and Gas Distribution
- (d) Install Fuel Line Distribution

(3) Construction of Temporary Facilities

- (a) Construct Decontamination Facilities
- (b) Construct Sample and Derived Waste Storage Facility
- (c) Construct Field Offices
- (d) Construct Mobile Laboratory
- (e) Construct Other Temporary Facilities

3.1.3 Demobilization. Demobilize the field laboratory.

- (1) Removal of Temporary Facilities
- (2) Site Restoration

3.2 Field Investigation. Conduct environmental sampling to include the following:

3.2.1 Perform Site Reconnaissance. The contractor shall conduct site surveys including property, boundary, utility rights-of-way, and topographic information. These surveys are to refine the survey data from the RI/FS and to ensure the accuracy of the information for the RD.

For items of this Model Statement of Work that are not needed for a given project, please retain the numbers for the items, but enter "Not Used" or "N/A" after the numbers of those items.

For the items used for a given project, additional descriptions (e.g., type of samples and estimated number) should be added in order for the contractor and RPM/WAM to develop estimated costs on a common basis.

- (1) Ecological Resources Reconnaissance
 - (a) Well Inventory
 - (b) Residential Well Sampling
 - (c) Land Survey
 - (d) Topographic Mapping
 - (e) Field Screening
- .3.2.2 Conduct Geological Investigations (Soils and Sediments)
 - (1) Collect Surface Soil Samples
 - (2) Collect Subsurface Soil Samples
 - (3) Soil Boring and Permeability Sampling
 - (4) Collect Sediments Samples
 - (5) Survey Soil Gases
 - (6) Test Pit
- .3.2.3 Conduct Air Investigations
 - (1) Sample Collection
 - (2) Air Monitoring Station
- .3.2.4 Conduct Hydrogeological Investigations: Ground Water
 - (1) Install Well Systems
 - (a) Accomplish Mobilization
 - (b) Develop Wells
 - (c) Conduct Downhole Geophysics
 - (d) Install Monitoring Wells
 - (e) Install Test Wells
 - (f) Install Gas Wells
 - (2) Collect Samples
 - (3) Collect Samples During Drilling (e.g., HydroPunch or Equivalent)
 - (4) Conduct Tidal Influence Study
 - (5) Perform Hydraulic Tests (Pump Tests)
 - (6) Measure Ground-Water Elevation
- .3.2.5 Conduct Hydrogeological Investigations: Surface Water
 - (1) Collect Samples
 - (2) Study Tidal Influence
 - (3) Measure Surface-Water Elevation
- .3.2.6 Conduct Waste Investigation
 - (1) Collect Samples (Gas, Liquid, Solid)
 - (2) Dispose of Derived Waste (Gas, Liquid, Solid)
- .3.2.7 Conduct Geophysical Investigation
 - (1) Surface Geophysical Activity [can just list these]
 - (2) Magnetometer
 - (3) Electromagnetics
 - (4) Ground-Penetrating Radar
 - (5) Seismic Refraction
 - (6) Resistivity
 - (7) Site Meteorology
 - (8) Cone Penetrometer Survey
 - (9) Remote Sensor Survey
 - (10) Radiological Investigation
- .3.2.8 Conduct Ecological Investigation
 - (1) Wetland and Habitat Delineation
 - (2) Wildlife Observations
 - (3) Community Characterization
 - (4) Identification of Endangered Species
 - (5) Biota Sampling and Population Studies
- .3.2.9 Collect Contaminated Building Samples.

- .3.2.10 Dispose of Investigation-Derived Waste. Characterize and dispose of investigation-derived wastes in accordance with local, State, and Federal regulations as specified in the FSP (see the Fact Sheet, *Guide to Management of Investigation-Derived Wastes*, 9345.3-03FS (January 1992)).

1. The WAM/RPM must determine the types of sampling that will be needed and select from the list above.
2. The numbers of samples anticipated should be specified so that both the contractor and the WAM/RPM can develop the cost estimates.
3. The WAM/RPM should consult with the Technical Review Team to determine the types and numbers of samples to be collected. The numbers may be refined upon negotiation with the contractor.
4. The WAM/RPM should specify the expected written and/or photographic documentation to be recorded in the field.
5. The WAM/RPM should specify the type of field activity reports that are expected, the frequency, and required distribution (RPM, State representative, etc.).

3.4 Sample Analysis

The contractor shall arrange for the analysis of environmental samples collected during the previous task. The sample analysis task begins with reserving sample slots in the CLP and the completion of the field sampling program. This task ends with the contractor validating the analytical data received from the laboratory.

1. The RPM/WAM should consider adding a subtask for on-site laboratory analysis. The purpose of this new subtask would be to perform screening analyses only.
2. If special analytical services (SAS) are required, they must be specified in a subtask.

The contractor shall perform the following activities or combination of activities to analyze test results:

- .4.1 Screening-Type Laboratory Sample Analysis
 - .4.1.1 Analyze Air and Gas Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.1.2 Analyze Ground-Water Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.1.3 Analyze Surface-Water Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.1.4 Analyze Soil and Sediment Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.1.5 Analyze Waste (Gas) Samples
 - (1) Organic
 - (2) Inorganic

- (3) Radiochemistry
 - .4.1.6 Analyze Waste (Liquid) Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.1.7 Analyze Waste (Solid) Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.1.8 Analyze Biota Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.1.9 Analyze Bioassay Samples
 - .4.1.10 Perform Bioaccumulation Studies
- .4.2 CLP-Type Laboratory Sample Analysis
 - .4.2.1 Analyze Air and Gas Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.2.2 Analyze Ground-Water Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.2.3 Analyze Surface-Water Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.2.4 Analyze Soil and Sediment Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.2.5 Analyze Waste (Gas) Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.2.6 Analyze Waste (Liquid) Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.2.7 Analyze Waste (Solid) Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.2.8 Analyze Biota Samples
 - (1) Organic
 - (2) Inorganic
 - (3) Radiochemistry
 - .4.2.9 Analyze Bioassay Samples
 - .4.2.10 Perform Bioaccumulation Studies

3.5 Analytical Support and Data Validation

The contractor shall arrange for the validation of environmental samples collected during the previous task. The sample validation task begins with reserving sample slots in the CLP and the completion of the

field sampling program. This task ends with the contractor validating the analytical data received from the laboratory.

Perform appropriate data validation to ensure that the data are accurate and defensible.

1. For RD, full data validation procedures are usually not necessary. The WAM/RPM may want to specify the level of data validation required.
2. The WAM/RPM should specify the format for submissions if there are Region-specific requirements or if you have specific requirements.

The contractor shall perform the following activities or combination of activities to validate test results:

- .5.1 Prepare and Ship Environmental Samples
 - .5.1.1 Ground-Water Samples
 - .5.1.2 Surface and Subsurface Soil Samples
 - .5.1.3 Surface-Water and Sediment Samples
 - .5.1.4 Air Samples
 - .5.1.5 Biota Samples
 - .5.1.6 Other Types of Media Sampling and Screening
- .5.2 Coordinate with Appropriate Sample Management Personnel
- .5.3 Implement EPA-Approved Laboratory QA Program.
- .5.4 Provide Sample Management (Chain of Custody, Sample Retention, and Data Storage)
Ensure the proper management of samples. Ensure accurate chain-of-custody procedures for sample tracking, protective sample packing techniques, and proper sample-preservation techniques.
- .5.5 Validate Data
 - .5.5.1 Review Analysis Results Against Validation Criteria
 - .5.5.2 Provide Written Documentation of Validation Efforts

The WAM/RPM should specify the format for submissions if there are Region-specific requirements or if the WAM/RPM has specific requirements.

3.6 Data Evaluation

The contractor shall organize and evaluate existing data and data gathered during the previous tasks that will be used later in the RD effort. Data evaluation begins with the receipt of analytical data from the data acquisition task and ends with the submittal of the Data Evaluation Summary Report. Specifically, the contractor shall perform the following activities or combination of activities during the data evaluation effort:

- .6.1 Data Usability Evaluation and Field QA/QC
- .6.2 Data Reduction, Tabulation, and Evaluation.
Evaluate, interpret, and tabulate data in an appropriate presentation format for final data tables. Design and set up an appropriate database for pertinent information collected that will be used during the RD.
 - .6.2.1 Evaluate Geological Data (Soils and Sediments)
 - .6.2.2 Evaluate Air Data
 - .6.2.3 Evaluate Hydrogeological Data: Ground Water
 - .6.2.4 Evaluate Hydrogeological Data: Surface Water
 - .6.2.5 Evaluate Waste Data
 - .6.2.6 Evaluate Geophysical Data
 - .6.2.7 Evaluate Ecological Data
- .6.3 Modeling
 - .6.3.1 Contaminant Fate and Transport

- .6.3.2 Water Quality
- .6.3.3 Ground Water
- .6.3.4 Air
- .6.3.5 Other Modeling
- .6.4 Develop Data Evaluation Report. Evaluate and present results in a Data Evaluation Summary Report and submit to the WAM/RPM for review and approval. After the WAM/RPM's review, attend a meeting with EPA to discuss data evaluation results and next steps.

The WAM/RPM should specify the format for submissions if there are Region-specific requirements or if the WAM/RPM has specific requirements.

The WAM/RPM should specify that the contractor shall prepare and submit a Technical Memorandum to the WAM/RPM if new analytical data needs or significant data problems are identified during the evaluation.

3.7 Treatability Study and Pilot Testing

The purpose of the treatability study is to provide sizing and operations criteria that are used in design drawings and specifications and in the engineer's cost estimate to optimize the RD. The task begins with the preparation of a Treatability Study Work Plan that provides the technical specifics of the study and ends with the contractor's submittal of the Treatability Study Evaluation Report. In some instances, information on technology performance can be found in the current literature and should be reviewed before the Treatability Study is designed.

The three levels of treatability studies are laboratory screening, bench-scale testing, and pilot-scale testing. The laboratory screening is used to establish the validity of a technology to treat waste and is normally conducted during the FS. Bench-scale testing is used to identify the performance of the technology specific to a type of waste for an operable unit. Often bench-scale tests are conducted during the FS. Pilot-scale testing is used to provide quantitative performance, cost, and design information for remediation and is typically performed during RD (see the Fact Sheet, *Guide for Conducting Treatability Studies Under CERCLA*, November, 1993).

In accordance with the design management schedule established in the approved RD Work Plan, the contractor shall perform the following activities:

- .7.1 Literature Search
- .7.2 Develop Treatability and Pilot Work Plan
 - Prepare the Treatability Study Work plan and submit to the WAM/RPM for review and approval. The Treatability Study Work Plan shall describe the technology to be tested, test objectives, test equipment or systems, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety procedures, and residual waste management. The DQOs for the treatability study shall also be documented. The Treatability Study Work Plan shall also describe pilot plant installation and startup, pilot plant operation and maintenance procedures, and operating conditions to be tested.
 - If testing is to be performed off-site, permitting requirements shall be addressed. A schedule for performing the treatability study shall be included with specific dates for each task and subtask, including EPA review periods. Key milestones that should have completion dates specified included, but are not limited to, the procurement of contractors and the completion of sample collection, the performance period, sample analysis, and report preparation.

In the SOW, the WAM/RPM should be clear about the expected schedule, and specify deadlines for each activity to maintain the overall RD schedule. When reviewing the contractor's Work Plan, check to see that the schedule in the Treatability Study Work Plan is consistent with the schedule in the RD Work Plan.

The Treatability Study Work Plan shall describe in detail the treatment process and how the proposed vendor or technology will meet the performance standards for the site. The Treatability Study Work Plan shall address how the contractor will meet all discharge or disposal requirements for any and all treated material, air, water, and expected effluents. Additionally, the Work Plan shall explain the proposed final treatment and disposal of all material generated by the proposed treatment system.

1. List the treatment train and components of the system if possible.
2. Where do treated water and residuals go?
3. Will there be discharges to air? Is an air pathway analysis needed to ensure the protection of workers and the public?
4. Does the contractor need to consider land disposal restrictions?
5. Consider having a contingency plan in case problems develop.

Conduct the Treatability Studies, as necessary, to determine whether the remediation technology or vendor of the technology can achieve the performance standards. Treatability studies shall be conducted as described in the EPA-approved Final Treatability Study Work Plan. The following activities may be required during the performance of the treatability study and pilot testing:

.7.3 Bench Test

- .7.3.1 Procure Test Facility and Equipment. The contractor shall procure test facility and equipment, including the procurement procedures necessary to acquire the vendor, equipment, or facility to execute the tests.
- .7.3.2 Provide Vendor and Analytical Service
- .7.3.3 Test and Operate Equipment. The contractor shall test equipment to ensure operation, then start up and operate equipment.
- .7.3.4 Retrieve Sample for Testing. The contractor shall obtain samples for testing as specified in the Treatability Work Plan.
- .7.3.5 Perform Laboratory Analysis. The contractor shall establish a field laboratory to facilitate fast-turnaround analysis of test samples, or, if necessary, shall procure outside laboratory services to analyze the test samples and evaluate test results.
- .7.3.6 Characterize and Dispose of Residuals

.7.4 Pilot-Scale Test

- .7.4.1 Procure Test Facility and Equipment. The contractor shall procure test facility and equipment, including the procurement procedures necessary to acquire the vendor, equipment, or facility to execute the tests.
- .7.4.2 Provide Vendor and Analytical Service
- .7.4.3 Test and Operate Equipment. The contractor shall test equipment to ensure operation, then start up and operate equipment.
- .7.4.4 Retrieve Sample for Testing. The contractor shall obtain samples for testing as specified in the Treatability Work Plan.
- .7.4.5 Perform Laboratory Analysis. The contractor shall establish a field laboratory to facilitate fast-turnaround analysis of test samples, or, if necessary, shall procure outside laboratory services to analyze the test samples and evaluate test results.
- .7.4.6 Characterize and Dispose of Residuals

.7.5 Field Test

- .7.5.1 Procure Test Facility and Equipment. The contractor shall procure test facility and equipment, including the procurement procedures necessary to acquire the vendor, equipment, or facility to execute the tests.
- .7.5.2 Provide Vendor and Analytical Service

- .7.5.3 Test and Operate Equipment. The contractor shall test equipment to ensure operation, then start up and operate equipment.
- .7.5.4 Retrieve Sample for Testing. The contractor shall obtain samples for testing as specified in the Treatability Work Plan.
- .7.5.5 Perform Laboratory Analysis. The contractor shall establish a field laboratory to facilitate fast-turnaround analysis of test samples, or, if necessary, shall procure outside laboratory services to analyze the test samples and evaluate test results.
- .7.5.6 Characterize and Dispose of Residuals
- .7.6 Develop Treatability Study Report.
 _____ days after completion of the Treatability Study, the contractor shall prepare and submit the Treatability Study Evaluation Report that describes the performance of the technology. The study results shall clearly indicate the performance of the technology or vendor compared with the performance standards established for the site. The report shall also evaluate the treatment technology's effectiveness, implementability, cost, and final results compared with the predicted results. The report shall also evaluate full-scale application of the technology, including a sensitivity analysis identifying the key parameters affecting full-scale operation.

Specify the format for submissions if there are Region-specific requirements or if there are other specific requirements.

Consider holding a project review meeting with the Technical Review Committee and other team members after completing the above task to present treatability study results and to summarize the RD status.

3.8 Preliminary Design

Preliminary Design begins with the initial design and ends with the completion of approximately 30 percent of the design effort. At this stage, the contractor shall have field-verified the existing conditions of the site, as necessary. The contractor shall provide supporting data and documentation with the design documents defining the functional aspects of the project to prove that the completed project will be effective in meeting the remediation goals and applicable or relevant and appropriate requirements (ARARs). For projects where the U.S. Army Corps of Engineers (USACE) is responsible for RA performance, the contractor shall prepare design submittals to conform to the format prescribed in *Technical Requirements for Pre-Design and Design Submittals*, USACE, ETL 1006. In accordance with the schedule established in the RD Work Plan, the contractor shall submit to EPA the Preliminary Design, which shall consist of the following subtasks:

Depending on the RA complexity, the WAM/RPM may require design submittals at 30 percent and again at 95 to 100 percent, eliminating the intermediate design submittal at 60 percent design completion.

.8.1 Preliminary Design

The contractor shall prepare a Design Criteria Report that defines in detail the technical parameters upon which the design will be based. Specifically, the Design Criteria Report shall include the preliminary design assumptions and parameters, including (1) waste characterization; (2) pretreating requirements; (3) volume and types of each medium requiring treatment; (4) treatment schemes (including all media and byproducts), rates, and required qualities of waste streams (i.e., input and output rates, influent and effluent qualities, potential air emissions, and so forth); (5) performance standards; (6) long-term performance monitoring and operations and maintenance (O&M) requirements; (7) compliance with all ARARs, pertinent codes, and standards; (8) technical factors of importance to the design and construction including use of currently accepted environmental control measures, constructability of the design, and use of currently acceptable construction

practices and techniques. In addition to a Design Criteria Report, the contractor shall do the following:

It is recommended that a Design Criteria Report be submitted at approximately 10 percent completion.

- .8.1.1 Recommend Project Delivery Strategy and Scheduling. The schedule shall include an evaluation of a phased approach to expedite the RA.
- .8.1.2 Prepare Preliminary Construction Schedule. A preliminary RA schedule appropriate to the size and complexity of the project shall be included in the plans and specifications.
- .8.1.3 Prepare Specifications Outline. The general specifications outline shall include all specification sections to be used. Format and organization shall be as described in Chapter 10 of the *Architect Engineer Manual*, USACE, AEIM-14, Omaha District, July 1989, which incorporates the Construction Specification Institute (CSI) format. USACE also developed standardized specifications for RDs that should be used whenever possible. Ms. Tammian McDaniel at EPA Headquarters (Tel. 202-761-4363) may be contacted for more information.

The need for performance specifications in lieu of a detailed design is determined under this subtask.

- .8.1.4 Prepare Preliminary Drawings. The drawings and schematics shall reflect organization and clarity. This submittal should include (1) an outline or listing of proposed drawings and schematics; (2) facility representations including a revised process flow diagram and a preliminary piping and instrumentation diagram; (3) a general arrangement diagram; and (4) site drawings. Engineering drawings shall be submitted in full size and half size reproductions. Standard formats for use in preparing design drawings shall be those described in the *USACE Architect Engineer Manual*.

The character of the drawings and schematics will vary according to the remedy. Formatting requirements for the drawings should be specified in this subtask.

- .8.1.5 Prepare Basis of Design Report. The contractor shall submit a detailed description of the evaluations conducted to select the design approach as part of the Basis of Design Report. This report shall include a Summary and Detailed Justification of Assumptions. This summary shall include (1) calculations supporting the assumptions; (2) a draft process flow diagram; (3) a detailed evaluation of how all ARARs will be met; (4) a plan for minimizing environmental and public impacts; and (5) a plan for satisfying permitting requirements.
- .8.1.6 Prepare Preliminary Cost Estimate. The preliminary RA cost estimate shall be a preliminary evaluation of the costs of all the elements of the RA. The estimate should be accurate within plus _____ percent and minus _____ percent and be prepared by using the M-CACES Gold cost estimating system for remedial action. Results of the value engineering (VE) screening are presented as part of the RA cost estimate. (See subtask 3.8.4.)

1. In the subtask above, use plus 40 percent and minus 20 percent for simple projects; plus 50 percent and minus 30 percent for complex projects.

2. M-CACES Gold Estimating System is the computer software currently used for estimating construction costs by the U.S. Army of Corps of Engineers (USACE) for its RA projects and will facilitate its review of the cost estimate. The use of this system is required under Response Action Contracts (RACs) but is optional under ARCS contracts.

.8.2 Describe Variances with the ROD

If the contractor finds that the RA being designed differs from the ROD or that an ARAR cannot be met, the contractor shall describe the issue and recommend technical solutions in a memorandum to the WAM/RPM.

.8.3 Land Acquisition and Easement Requirements

The need for land acquisition for access and easement requirements shall be identified and submitted as part of the Basis of Design Report.

.8.3.1 Identify Need and Locations

.8.3.2 Provide Technical Support for Land Acquisition Efforts

.8.4 Conduct and/or Assist in Value Engineering Screening

The VE screening shall include an evaluation of cost and function relationships, concentrating on high-cost areas. The VE screening shall be performed by an independent Value Engineering group that is not otherwise participating in the RD. The outcome of the screening shall be a recommendation for or against a full-scale VE study (a subtask performed during intermediate design) based on the potential for cost savings as a result of design changes. [Value Engineering Fact Sheet, May 1990.]

.8.5 Respond to Design Review Comments

The contractor shall consolidate and respond to design review comments. A written response to each comment shall be provided. The response shall indicate whether the contractor has decided to implement a design change as a result of the comment, and how the change will impact the selected remedy, RD/RA costs, and/or schedule. A summary of the responses to comments shall be submitted to the WAM prior to initiation of Intermediate Design. The design changes shall be incorporated under Intermediate Design (Task 3.10).

.8.6 Participate in Preliminary Design Review or Briefing

The contractor shall participate in design review meetings to be held at Region _____ offices.

The WAM/RPM should specify the format for submissions if there are Region-specific requirements or other specific requirements.

The contractor shall implement QC procedures to ensure the quality of all reports and submittals to EPA. These procedures shall include, but are not limited to, internal technical and editorial review; the independent verification of all calculations used in the design; and the documentation of all reviews, the problems identified, and corrective actions taken.

[NOTE: ITEMS 3.8.2 THROUGH 3.8.6, INCLUSIVE, ARE NOT INCLUDED IN THE 6-PERCENT DESIGN LIMITATION CALCULATIONS.]

3.9 Equipment, Services, and Utilities

This task includes all efforts necessary to procure long-lead equipment and/or services.

.9.1 Identify Long-Lead Equipment Services and/or Utilities

The contractor shall prepare a list of any elements or components of the facility that will require custom fabrication or long lead time for procurement. The list shall also state the basis for such need, and list the recognized sources of such procurement.

This task does not include contract award. Contract award should normally be conducted as part of a separate RA work assignment.

.9.2 Procure Long-Lead Equipment Services and/or Utilities

The contractor shall prepare necessary plans and specifications, advertise for, and evaluate bids for equipment and services.

3.10 Intermediate Design

The intermediate design begins at the completion of the preliminary design phase and ends with the completion of approximately 60 percent of the total design effort. The contractor shall submit to EPA the Intermediate Design submittal which shall consist of a continuation and expansion of the Preliminary Design submittal. Review comments on the Preliminary Design shall be reflected in the Intermediate Design. A Value Engineering Study shall be performed based on approved recommendations from the VE screening submitted with the preliminary design. The Intermediate Design documents shall be submitted in accordance with the approved design management schedule and shall consist of the following subtasks:

.10.1 Update Construction Schedule

The schedule for implementation of the RA shall identify the timing for initiation and completion of all critical path tasks. The schedule shall specifically identify duration for completion of the project and major milestones.

.10.2 Prepare Intermediate Specifications

Plans and specifications shall conform to acceptable standards and shall be formatted in accordance with CSI requirements. Plans and specifications shall include preliminary specifications for construction, installation, site preparation, and field work standards, including an equipment startup and operator training plan. A table of contents for the general specifications shall be provided with this submittal. All specifications shall conform to CSI format.

.10.3 Prepare Intermediate Drawings

The contractor shall submit an outline or listing of drawings: facility representations containing a process flow diagram, a piping and instrumentation diagram, and a control logic table; and continuation and expansion of drawings submitted with the Preliminary Plans and Specifications. Include engineering drawings for grading/paving, foundation, and electrical, structural, and mechanical elements, etc.

.10.4 Prepare and Submit Revised Basis of Design Report

The contractor shall submit a revised summary of the evaluations conducted to select the design approach as part of the revised Basis of Design Report. The report shall include the following components:

- Summary and Detailed Justification of Assumptions. This summary shall include: (1) design calculations supporting the assumptions; (2) a revised process flow diagram; (3) a detailed evaluation of how ARARs will be met; (4) a plan for minimization of environmental and public impacts; and (5) heat and mass balances.
- Recommended RA Contracting Strategy. The contractor shall address the management approach for procuring the RA contractor, including procurement methods, phasing alternatives, and contractor and equipment availability concerns.
- Plan for Satisfying Permitting Requirements. EPA comments shall be incorporated into an updated Permits Plan.
- Identification of Easement and Access Requirements. The need for land acquisitions for access and easement requirements shall be identified and submitted as part of the Intermediate Design.

Identification of the projected O&M requirements and development of an estimate of annual O&M costs.

.10.5 Prepare Revised RA Cost Estimate

This revised estimate of the RA shall be developed using flow sheets, layouts, and equipment details. The estimate shall be accurate within plus ___ percent and minus ___ percent and be prepared using the M-CACES Gold Cost Estimating System for Remedial Action.

1. In the subtask above, use plus 30 percent and minus 15 percent for simple projects; plus 40 percent and minus 20 percent for complex projects.
2. Use of M-CACES Gold Estimating System computer software for the cost estimate is required for EPA RD work assignments under RACs and is recommended for ARCS. This system is used by USACE for construction cost estimating and will enable contractor-prepared construction estimates to be reviewed more readily for accuracy.

.10.6 Participate in Intermediate Design Review or Briefing

The contractor shall participate in a variety of design review activities, including design review meetings to be held at Region _____. The contractor shall also perform and submit a report describing the results of the following design reviews:

- .10.6.1 Initial Constructability Review. The contractor shall review and provide written comments for the Initial Constructability Review. The constructability review shall be conducted to evaluate the suitability of the proposed project and its components in relation to the project size.
- .10.6.2 Initial Biddability Review. The contractor shall review and provide written comments for the initial biddability review.
- .10.6.3 Initial Operability Review. The contractor shall review and provide written comments for the Initial Operability Review. The operability review shall assure that the completed project will conform to applicable performance and operations requirements.
- .10.6.4 Initial Environmental Review. The contractor shall review and provide written comments for the Initial Environmental Review.
- .10.6.5 Initial Claims Prevention Screening. The contractor shall review and provide written comments for the Initial Claims Prevention Screening. The claims prevention review is to be conducted to eliminate conflicts, inconsistencies, ambiguities, errors, omissions, or other identifiable problems in the plans, specifications, and contract documents that are subject to change orders and contractor claims.

.10.7 Perform VE Study and Report Recommendations

The VE Study shall be conducted and the Report prepared by an independent Value Engineering group that is not otherwise participating in the RD (as in subtask 3.8.4).

.10.8 Describe Variances with the ROD

If the contractor finds that the remedial action being designed differs from the ROD, or that an ARAR cannot be met, the contractor shall describe the issue and recommend technical solutions in a memorandum to the WAM/RPM.

.10.9 Respond to Design Review Comments

A written response to each comment shall be provided. The response shall indicate whether the contractor has decided to implement a design change as a result of the summary of the responses to comments shall be submitted to the WAM prior to initiation of Intermediate Design. The design changes shall be incorporated under Intermediate Design (Task 3.10).

[NOTE: ITEMS 3.10.6 THROUGH 3.10.9 ARE NOT INCLUDED IN THE 6-PERCENT DESIGN LIMITATION CALCULATIONS.]

3.11 Prefinal and Final Design

The contractor shall submit the Prefinal Design according to the design management schedule. The Prefinal Design shall function as the draft version of the Final Design. The Prefinal Design shall address comments generated from the Intermediate Design Review and clearly show any modifications of the design as a result of incorporation of the comments. After EPA review and comment on the Prefinal Design, the Final Design shall be submitted. All Final Design documents shall be approved by a Professional Engineer registered in _____ (state where site is located). EPA approval of the Final Design is required before initiating the RA, unless specifically authorized by EPA.

.11.1 Prepare Prefinal Design Specifications

A complete set of construction drawings and specifications (general specifications, drawings, and schematics) shall be submitted at the prefinal stage. All specifications shall conform to CSI format. Value engineering report recommendations (submitted with the intermediate design) that have been approved by EPA shall be incorporated into the prefinal design drawings and specifications. The final design plans and specifications must be consistent with the technical requirements of all ARARs. Any off-site disposal shall be in compliance with the policies stated in the Procedure for Planning and Implementing Off-Site Response Actions (*Federal Register*, Volume 50, Number 214, November 1985 pages 45933-45937) and other applicable guidance.

General correlation between drawings and technical specifications is a basic requirement of any set of working construction plans and specifications. Before submitting the project specifications, the contractor shall coordinate and cross-check the specifications and drawings; and complete the proofing of the edited specifications and the cross-checking of all drawings and specifications.

.11.2 Prepare Prefinal Drawings

The final submittals shall include a complete set of construction drawings and specifications as well as a set of one-half size reductions of drawings. All specifications shall conform to CSI format.

.11.3 Prepare Final Basis of Design Report that incorporate any changes since the intermediate design submittal.

.11.4 Prepare Revised RA Cost Estimate

The contractor shall prepare a definitive cost estimate of the offers to be received for RA for each work item from definitive engineering data, within an accuracy of plus 15 percent to minus 5 percent. The definitive cost estimate should be accompanied by a range estimate and analysis of the project's potential scope, cost, and schedule change during RA, broken down by work activity. One copy of the quantity takeoff sheets, including the appropriate items, shall be included with each estimate submitted. All work items shall be broken down into labor, materials, and equipment. The contractor shall provide the basis for development of all unit prices used in the estimate. Unit prices, overhead, profit, and other categories shall be shown as separate items. The final estimate will be based on the advertised plans and specifications including amendments. It should reflect current prices for labor, materials, and equipment. The estimate shall separately identify contingencies within the defined project scope. The contractor shall prepare the RA cost estimates by using the M-CACES Gold Estimating System.

The use of M-CACES Gold Estimating System for the cost estimate is required for RD work assignments under RACs and is recommended under ARCS.

.11.5 Prepare 100-Percent Design Submittal

.11.6 Participate in Prefinal/Final Design Review

The contractor shall participate in a Prefinal Design review meeting. The meeting shall be held at Region ___ headquarters. The contractor shall also consolidate and respond to Intermediate and Prefinal Design review comments. A written response for each comment shall be provided before incorporating the changes into the design. The changes shall be incorporated as part of the 100-Percent Design submittal.

.11.7 Prepare Subcontract Award Documents

The contractor shall prepare complete contract documents, including (1) complete RA SOW including, wherever appropriate, drawings and specifications, complete cost proposal, and the required schedule; (2) terms and conditions of the contract including payments, delivery schedule, point of delivery, and acceptance criteria; (3) method of procurement including evaluation, basis, and method of awarding contract; (4) criteria to be employed in evaluating bids and offers; (5) prevailing wage determinations (DBA); (6) deadline and location for submitting bids and offers, if applicable; and (7) appropriate contract clauses.

.11.8 Perform Biddability, Operability, and Constructability Reviews

The contractor shall conduct final constructability, biddability, operability, environmental, and claims prevention reviews and document results.

- .11.9 Prepare Revised Project Delivery Strategy
- .11.10 Document VE Modifications
- .11.11 Draft Operations and Maintenance (O&M) Manual

The manual should include the following:

- .11.11.1 An operations and maintenance plan that includes a description of normal operation and maintenance including start-up procedures, tasks for operation, tasks for maintenance, prescribed treatment or operation conditions, and schedule for each O&M task
- .11.11.2 A description of potential operating problems including common and/or anticipated remedies and useful-life analysis of significant components and replacement costs
- .11.11.3 Quality Assurance Plan for O&M including a description of routine monitoring tasks, description of required laboratory tests and their interpretation, required data collection, and location of monitoring points comprising the points of compliance monitoring
- .11.11.4 Alternate procedures to prevent releases or threatened releases of hazardous substances, pollutants, or contaminants, which may endanger health and the environment or cause an exceedance of any cleanup standard
- .11.11.5 Corrective action to be implemented in the event that cleanup standards for ground water, surface water discharges, and air emissions are exceeded and a schedule for implementing these corrective actions
- .11.11.6 Safety Plan for O&M including a description of precautions and necessary equipment for site personnel, safety tasks required in event of systems failure, and safety tasks necessary to address protection of nearby residents.
- .11.11.7 Description of equipment including the equipment identification numbers, installation of monitoring components, maintenance of site equipment, and replacement schedule for equipment and installed components

[NOTE: ITEMS 11.6 THROUGH 11.10, INCLUSIVE, ARE NOT INCLUDED IN THE 6-PERCENT DESIGN LIMITATION CALCULATIONS.]

- .11.11.8 Records and reporting mechanisms required including daily operating logs, laboratory records, records for operating costs, mechanism for reporting emergencies, personnel and maintenance records, and reports to U.S. EPA, its designates, and the State.

If RA does not require O&M, delete the text and insert "not used" or "N/A" after line item 3.11.11.

.11.12 Construction Quality Assurance Plan

The contractor shall submit as part of the Prefinal Design a draft Construction Quality Assurance (CQA) Plan. The CQA Plan shall be prepared in accordance with "Construction Quality Assurance for Hazardous Waste Land Disposal Facilities" (EPA, October, 1986). The CQA Plan shall then be finalized and submitted with the Final Design. At a minimum, the draft QA Plan shall provide requirements for the following elements:

- .11.12.1 Responsibility and authority of all organization and key personnel involved in the remediation action construction
- .11.12.2 CQA Personnel Qualifications. The contractor shall establish the minimum qualifications of the CQA Officer and supporting inspection personnel.
- .11.12.3 Inspection Activities. The contractor shall establish the observations and tests that will be required to monitor the construction and/or installation of the components of the Remedial Action(s). The plan shall include the scope and frequency of each type of inspection to be conducted. Inspections shall be required to verify compliance with environmental requirements and include, but not be limited to, air quality and emissions monitoring records, waste disposal records (e.g., RCRA transportation manifests), etc. Inspections shall also ensure compliance with all health and safety procedures.

- .11.12.4 Sampling requirements. The contractor shall establish the requirements for sampling activities, sample size, sample locations, frequency of testing, criteria for acceptance and rejection, and plans for correcting problems as addressed in the project specifications.
- .11.12.5 Documentation. The contractor shall describe the reporting requirements for CQA activities. This shall include such items as daily summary reports and inspection data sheets.

3.12 Postremedial Design Support

This task consists of support required to prepare contract bidding documents and issue the Invitation for Bids or the Request for Proposals. The task starts with EPA's approval of contract documents developed under Task 11 and ends with the submittal of construction contractors' bids. The contractor shall perform the following postremedial design activities:

- .12.1 Prebid (Presolicitation) Activities
 - .12.1.1 Printing and Distribution of Contract Documents. Print and distribute to prospective bidders the contract documents that were finalized in Task 11.
 - .12.1.2 Advertising and Soliciting of Bids. Advertise and solicit bids for construction services. An advertisement shall be prepared and published in
 - (1) Prebid (Presolicitation) Meetings. The contractor shall arrange and attend prebid meetings to provide clarification on plans, specifications, and contract documents to all bidders.
 - (2) Resolution of Inquiries and/or Issuing Addenda. The contractor shall resolve bidder inquiries and document all contact with potential bidders, and issue amendments to contract documents if additional information becomes available that all bidders should be made aware of after solicitation.
 - (3) On-Site Visits. The contractor shall participate in on-site visits that may be required to further clarify the services required.
- .12.2 Preaward Activities
 - .12.2.1 Receipt of Bids (Offers)
 - (1) Determination of Responsive, Responsible Bidders (Offerors)
 - (2) Perform Reference Checks
 - (3) Prepare Bid (Offer) Tabulation
 - (4) Perform Bid (Offer) Analysis
 - .12.2.2 Receipt and review of Followup Items from Lowest Responsible Bidder (Offeror)
 - .12.2.3 Review of EEO and MBE Requirements and SDB Subcontracting Plans
- .12.3 Update Site-Specific Plans
 - .12.3.1 Modify Site Management Plan (if necessary)
 - .12.3.2 Modify Sampling and Analysis Plan (if necessary)
 - .12.3.3 Modify Health and Safety Plan (if necessary)
 - .12.3.4 Modify Community Relations Plan (if necessary)

In some cases, it may be advisable to use this task to initiate the procurement process, although these services can be procured as part of the RA work assignment.

3.13 Work Assignment Closeout

- .13.1 Return Documents to Government
- .13.2 Duplicate, Distribute, and Store Files
- .13.3 Archive Files
- .13.4 Prepare Microfiche, Microfilm, and Optical Disk
- .13.5 Prepare Closeout Report. The contractor shall include a breakdown on disk of final costs and Level of Effort (by P-level) in the same detail and format as the Work Breakdown Structure (Attachment 2).